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ABSTRACT

Findings of a study that examined the effects of teacher behavior and organizational factors on student behavior in peer work groups are presented in this paper. Methodology included observation of one classroom from each of 10 Dutch elementary schools that frequently used forms of peer work groups and teacher interviews. Findings indicate that cooperative work groups were used only 20 percent of the total peer group time, even by teachers who said that they frequently used cooperative learning. Helping groups were the most frequently used type of peer work group. Teachers used individualistic reward structures; the groups did not demonstrate competitive reward structures. The degree to which students were involved in their tasks and showed desirable/undesirable interactions during peer work groups was related to organizational factors and teacher behavior. Organizational factors, such as group type and composition, influenced the kind of student interaction. For application tasks, monitoring by the teacher promoted student involvement and favorable interactions. Ten tables are included. (LMI)

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PEER WORK GROUPS IN DUTCH CLASSROOM PRACTICE

Effects of teacher behavior and organizational factors on student behavior in peer work groups

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INTRODUCTION

In peer work groups (also known as small groups or cooperative learning), students are seated in groups and work together. During the last 15 years, a lot of research was carried out on the effects of methods of cooperative learning. However, little is known about the practice of peer group work in regular classrooms. In the Netherlands (and in the United States) peer work groups are not frequently used (Graybeal & Stodolsky, 1985; Ros, 1992). Six percent of Dutch elementary school teachers say that they frequently use cooperative groups in mathematics instruction, 7% in language instruction and 30% in science instruction (Ros, 1992); 35% of the teachers allow students to help each other in mathematics instruction, 26% of the teachers in language instruction and 61% of the teachers in science instruction.

This study observed teachers who said they used peer work groups frequently. The study focuses on the behavior of students in peer work groups under different organizational conditions. The role of the teacher, often neglected in this research field, is also taken into account. So this study also focuses on the question of how teachers arrange peer work groups, and which teacher behavior can cause favorable student behavior.

THEORETICAL FRAMEWORK

Before the effects of teacher behavior and organizational factors concerning peer work groups on student behaviors are discussed, favorable student behavior will be described first.
The main student behaviors in peer work groups, that may be regarded as favorable for achievement, are:
- students should interact in a constructive manner about tasks,
- students should be involved in tasks.

Hertz-Lazarowitz (1989) distinguishes three types of **interaction** that occur during peer work groups:
- cooperation: on-task interaction among students who are working together (their relation is based on equality),
- helping: one student explaining in response to another student's need for help,
- non-task related interactions: interactions that have nothing to do with the task.

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Hertz-Lazarowitz found that in Israeli schools (grade 3 to 8) 25% of the observed student' behaviors consisted of interactions with another student: 4% of the student behaviors is spent on helping, 13% on cooperation and 8% on off-task interactions. Hertz-lazarowitz did not investigate relations with achievement.

Webb (1991) made a further distinction between different types of helping in peer work groups: giving elaborated explanations to another student versus giving no answer to the required help, or only the (correct) answer without further explanations. Webb carried out a meta-analysis of 17 studies on the effects of giving/receiving help on student achievement in classroom practice. She found that giving elaborated explanations is positively related with achievement, while receiving a lower level of help than requested (asking for explanations and receiving no answer, or just being told the correct answer) is negatively related with achievement. Off-task interactions showed a negative correlation with student achievement as well.

So elaborated explanations and cooperation are considered favorable interactions, but low-level help and off-task interactions are unfavorable.

Research on students' **time-on-task** behavior and students' achievement predominantly showed positive correlations (Doyle, 1986). Time-on-task behavior is considered a necessary, but insufficient condition for learning (Fraser et al, 1987). In peer work groups, students may be less involved than during other teaching methods:

- when students interact, the noise in the classroom can keep students from doing their work; they may be less concentrated,
- for teachers, it is more difficult to monitor the activities of all students, because of the noise and because some students are sitting with their backs to the teacher.

On the other hand, students may be more involved in peer work groups, as they are stimulated and motivated by their groupmates (Slavin, 1987), and they do not need to wait for the teacher if they have questions.

The next question is: which organizational factors and which teacher behaviors influence student interactions and involvement?

An important **organizational factor** that affects interactions between students is the kind of peer work group. Graybeal and Stodolsky (1985) classified peer work groups based on:

- task structure: cooperative (students of the same level of ability solve a task together) and helping (one student helps another student),
- reward structure: cooperative (students have to produce a solution or paper together), competitive (rewards of the students or the groups are negatively dependent of achievement of other students/groups) and individualistic (each student is rewarded independently of the achievement of other students).

It seems obvious that students should give explanations to each other more often in helping task structures, while in cooperative groups they will cooperate more. Research of Graybeal and Stodolsky (1985) showed that the kind of peer work group was strongly related to school subjects: for mathematics helping groups with individualistic or competitive reward structures were formed and for social studies cooperative groups with cooperative reward structures. The cognitive level of tasks was also related to peer work groups: helping groups were only concerned with practicing concepts and skills, while cooperative groups also did tasks that required application, higher mental processes and non-cognitive activities besides practicing

skills. Graybeal and Stodolsky (1985) also related the type of peer work group to student involvement in tasks. Students seemed less involved in helping groups. Research of Slavin (1987) indicates that a cooperative reward system is one of the conditions for positive effects of cooperative learning. When students should produce a paper or solution together they are more motivated to stimulate and help each other.

Another organizational factor that affects student interactions and involvement is the formation of the groups. Teachers can apply various criteria to form groups, for example student ability. Webb and Cullian (1983) compared interaction processes in homogeneous and heterogeneous ability groups. In homogeneous groups, students requesting help did not get an answer, relatively often. Swing and Peterson (1982) and Bennett and Cas (1988) studied interaction in mixed ability groups. In broad heterogeneous groups (consisting of a high achiever, an average achiever and a low achiever) a kind of tutor-tutee relation between the high and low achievers was found, while average students were hardly involved in interactions. In narrow heterogeneous groups (low and average achievers / average and high achievers), all students participated actively.

With respect to the age of students (which is related to ability), Graziano, French, Brownell and Hartup (1976) found that mixed-age groups were more involved in tasks than same-age groups. Johnson, Johnson, Pierson and Lyons (1985) also showed that mixed-age groups were more motivated (relations with involvement or achievement were not investigated).

Another aspect of group formation is student gender. Several researchers found a tendency to gender segregation (a larger frequency of interactions between students of the same gender). However, the choice of interactional partners may be influenced more by proximity than by gender (Wilkinson, Lindow & Chiang, 1985). Morine-Dershimer (1985) concluded that girls are more cooperatively oriented than boys.

A final aspect of group formation is group size. In general, it is supposed that in larger groups it is more difficult for students to coordinate their activities (Webb, 1989; Wiersema, 1991). A diffusion of responsibilities may occur. On the other hand, in larger groups it is more likely that there will be at least one student who can help another student. So, for helping peer work groups larger groups are assumed to be more favorable, while smaller groups are considered more favorable for cooperation.

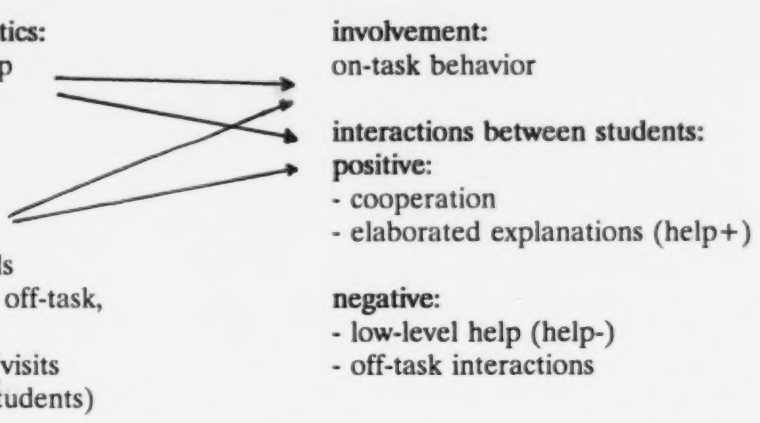
What is the optimal **teacher behavior** during peer work groups? Teachers are often a neglected factor in research concerning the interactions between students and the effects of cooperative learning . In so far as attention is paid to teachers, they are often considered to obstruct spontaneous interactions of students (Harwood, 1989). Cohen, Lotan and Leechor (1989) found a negative relation between the degree of teacher supervision (giving instructions and clues, asking questions and maintaining order) and the percentage of students that interact and cooperate in peer work groups. Cohen (1992) concludes that teachers who exercise more supervision, reduce possibilities for the students to communicate in peer work groups. If teachers feel responsible for the completion of tasks, students will not feel responsible to solve the problems related to tasks.

Many studies investigated the relation between teacher behavior and time-on-task behavior of students in regular classrooms (see for an overview Rosenshine & Stevens, 1986). The teachers who achieve the highest involvement of their students

monitor the class, walk through the classroom, have frequent contacts with all students, control student activities, and provide feedback frequently. Whether this relation between teacher behavior and student involvement also holds in peer work groups is not investigated.

So, research indicates that monitoring behavior of the teacher may raise the involvement of the students, but may in the same time obstruct the interactions of the students.

The hypothesized relations can be modelled as follows:



RESEARCH QUESTIONS

The study focuses on the following research questions:

1. How much time do Dutch elementary schools teachers spend on different types of peer work groups?
2. To what extent are students involved in tasks, and to what extent do they interact, in different organizational conditions?
3. What is the effect of teacher behavior during peer work groups on student involvement and interactions, taking the organizational factors into account?

METHOD

Ten elementary schools using forms of peer work groups frequently, participated in this study. Observations were carried out in one class of each school. Most classes were mixed-age classes (students of 8-10 years old). Two observers visited each school for four days. In total, 133 peer work group periods were observed. In peer work groups, one observer observed time-on-task behavior (every ten seconds one student in turn) and student interactions in one group. The observed group of students changed every lesson. Each group was observed at least once and maximally three times. On-task behavior was recorded when a student was working on his task or interacting about the task with another student or with the teacher. With respect to interactions, the type of interaction, the duration and the number of students involved was recorded. The following types of interactions were distinguished:

- cooperation: students of the same level work together and discuss tasks,
- elaborated help (help+): the student who required for help, receives elaborated

explanations of another student,
- low-level help (help-): the student who required for help, receives no answer or only the (correct) answer without further explanations,
- off-task interactions: interactions between students have nothing to do with their tasks,
- other interactions: this category mainly covers procedural questions, for example 'Which exercises should we make?', 'Can I borrow your pencil, please?'

The other observer observed the teacher during peer work groups. Every ten seconds the teacher's location (behind his desk, walking through the classroom or visiting a group of students) and the activity of the teacher was recorded:
- interacting with student(s), giving instructions, assignments, explanations,
- controlling student activities,
- observing students,
- off-task activities: activities that have nothing to do with the current lesson, for example correcting exercises, or leaving the classroom.

Before the observations started, pilot-observations took place in a non-participating school. The inter-observer reliabilities based on these pilot observations were satisfactory (mean Cohen's kappa, a strict measure, which corrects for coincidence, is .77, from .70 to .82).

In addition, both observers described the main activities of the classroom during the whole day; during peer work group they described the type of peer work group, subject, task and group composition (grade level, student gender, group size). The classification of the type of peer work groups was partly based on Graybeal and Stodolsky (1985) and partly based on pragmatic reasons.

Finally, each teacher was interviewed about the results of the observations.

Analyses

To answer the first research question the percentage, of time spent on different types of peer work groups is computed, for each day observed. For the second research question (student involvement and interactions under different organizational conditions), the mean percentage of time that students are on-task and the mean percentage of time a student spends on different types of interactions is computed.

To analyze the effects of teacher behavior and organizational factors on student behavior (the third research question), it has to be noticed that several lessons in only 10 classes are observed. So in this design lessons are nested within classes. If an effect of some aspect of teacher behavior occurs it is interesting to know whether this effect is caused by between-classes or between-lessons differences. In the latter case, generalizing results is more reliable, because the number of classes observed is small. One class severely deviating from the other classes may distort the results. For this reason, each teacher behavior variable is divided into two variables:
- mean score: for each teacher, the mean score of the observed lessons is computed,
- deviation score: for each lesson, the deviation from the mean score is calculated.

Multilevel analysis is the most appropriate method of analysis, because it is the only method that can handle different levels of analysis (in this case lessons and classes). In multilevel analysis, the total variance in the dependent variable is divided into variance components (a lesson and a class component). The next step is to account for these variance components by modeling independent variables. For each dependent variable (involvement of the students and the different types of

interaction), a multilevel analysis is carried out. The computer program VARCL (Variance Component Analysis) is used (Longford, 1986).

RESULTS

Time spent on peer work groups

Teachers spend 38% of the total lesson time on peer work groups and individual seatwork. All teachers used each type of peer work groups. Table 1 shows the percentage of total peer work group time spent on different types of peer work groups.

Table 1 Mean percentages of peer work group time teachers spent on different types of peer work groups

	mean	lowest	highest
- individual seatwork	7	0	3
helping groups			
- students are allowed to ask each other for help	58	27	99
- students ask firstly another student for help before they go to the teacher	14	0	65
cooperative groups			
- students are allowed to cooperate	8	0	15
- students should cooperate, but make a product (solution or paper) separately	6	0	15
- students should cooperate to achieve one (group) product together	6	0	25
total	100		

Most peer work group time is spent on helping groups: 58% of the total time spent on peer work groups, students work individually and are allowed to ask other students for help. They are also allowed to ask the teacher for explanations if they need help. For another 14% of the time, students should consult an other student firstly before going to the teacher. Cooperative groups are formed for a maximum of 20% of the peer work group time.

Involvement and interactions under different organizational conditions

The mean percentage of time students were on task in peer work groups is 67%. Data about the time students spend on interactions in peer work groups are given in Table 2.

Table 2 Mean percentages of peer work group time students spend on different types of interaction

	in own group	with other group	total
cooperation	5,3	0	5,3
elaborated help	4,1	1,4	5,5
low-level help	0,4	0	0,4
off-task interactions	4,4	0,8	5,2
remaining (procedural)	3,1	0,5	3,6
total	16,3	2,7	20,1
with the teacher			6,7

In total, a student talks for 20%, one fifth part of the total peer work group time, with another student. Interactions referring to elaborated help, cooperation and off-task interactions occur equally often. Low-level help (students who need help receive no answer, or only the (correct) answer, without further explanations), does not occur often. So if a student asks for help, (s)he receives mostly elaborated explanations. Students sometimes visit another group to ask for help or for social talk.

In the next tables student involvement and the interactions is shown under different organizational factors. Table 3 shows student involvement and interactions in the different types of peer work groups (the 'other interaction' category is left out).

Table 3 Involvement and interactions in different types of peer work groups (% of peer work group time)

	involvement	interactions between students				
	on-task	coop.	help+	help-	off-task	total
- individual seatwork	64	0,1	0,5	0,5	2,9	8,9
helping groups						
- students are allowed to ask each other for help	66	1,3	6,0	0,4	4,8	16,2
- students ask firstly another student for help before they go to the teacher	68	2,5	7,5	0,6	3,6	17,9
cooperative groups						
- students are allowed to cooperate	64	10,0	4,3	0,1	9,8	29,0
- students should cooperate, but make a product (solution or paper) separately	69	32,3	1,3	0,1	6,6	44,7
- students should cooperate to achieve one (group) product together	77	17,9	1,3	1,0	5,5	30,0

From Table 3, it is obvious that students are more involved when they should cooperate and produce one solution or product together, than in other peer work groups. Students are least involved during individual seatwork, and when they are allowed to choose whether they cooperate with another student or not. Regarding the high percentage of off-task interaction in the latter peer work group type, sociability may be a reason to choose for cooperation.

As was expected, cooperative interactions mainly occur when students work together on tasks. However, it is remarkable that students have more cooperative interactions in peer work groups when they make individual products than when they produce one solution or paper together (32% versus 18%). When students are allowed to ask each other for help, they spend about 7% of the time on giving and receiving explanations.

Table 4 presents data on student involvement and interactions for different subjects.

Table 4 Involvement and interactions for different subjects (% of peer work group time)

	involvement	interactions between students				
	on-task	coop.	help+	help-	off-task	total
- mathematics	71	6,6	4,0	0,6	3,8	19,4
- language	69	7,7	3,6	0,3	4,2	20,1
- sciences	71	8,2	8,1	0,5	3,4	22,9
- students may choose between math, language (and sciences)	71	1,7	6,2	0,5	4,7	16,6
- project activities	53	6,3	1,6	0,1	17,2	33,5

Table 4 shows that involvement is significantly lower in project activities (students choose a topic, search for information about this topic, and write and present a paper about it), namely 53%. This low percentage is related to the high percentage of off-task interactions (17%). There are hardly any differences in involvement between the other subjects.

In the participating schools, it often happens that students got assignments for the whole week for math, language, and sometimes also sciences. Students are allowed to decide when they work on which subject. Students hardly cooperate during these lessons, because they are not working on the same task at the same time.

During sciences, students cooperate and help each other more frequently than during math and language lessons.

Three types of tasks are distinguished, based on the kind of knowledge required: tasks focusing on learning facts by heart, tasks focusing on application of knowledge (only one answer possible) and tasks focusing on acquisition of knowledge (more answers possible). Only tasks focusing on the application of knowledge seemed to be used frequently (89% of the tasks). Just 3% of the tasks focuses on facts and 9% on acquisition of knowledge.

Because of this lack of variance in types of tasks, no involvement and interaction percentages during the performance of these tasks are presented.

The last organizational factor refers to the criteria for group composition teachers use. Three aspects of group composition are recorded: heterogeneity for grade and gender of the students and the group size. Table 5 presents student involvement and

interactions in homogeneous / heterogeneous groups concerning the grades of students.

Table 5 Involvement and interactions in homogeneous/heterogeneous groups, concerning the grade of students (% of peer work group time)

	involvement	interactions between students				
	on-task	coop.	help+	help-	off-task	total
- grade 6, 7 and 8 combined	67	3,9	6,2	0,4	4,6	18,8
- grade 6 and 7/grade 7 and 8	60	4,7	1,6	0,3	9,0	20,8
- grade 6/grade 7/grade 8	71	7,2	5,0	0,5	3,8	20,7

In mixed grade level groups, students are clearly less involved, than in groups consisting of students of one or three grades. At the same time, the students in these groups give explanations to each other less often and show more off-task interactions. As expected, cooperative interactions occur more often between students of the same grade, while the amount of time spent on giving/receiving help is higher in groups consisting of students of three grades.

Table 6 presents student involvement and extent of interactions for different group compositions concerning student gender.

Table 6 Involvement and interactions in homogeneous/heterogeneous groups, concerning the gender of students (% of peer work group time)

	involvement	interactions between students				
	on-task	coop.	help+	help-	off-task	total
- only boys	69	7,2	3,6	0	5,4	21,6
- mixed	65	3,1	5,7	0,3	4,7	17,3
- only girls	75	11,0	4,7	0,9	5,4	26,6

Groups consisting of only girls are far more involved than groups with boys. As expected, girls also cooperate more. However, girls are more likely to give low-level

answers on the request for help: they give more often no answer or only give the answer without further explanations to the girl that needs help. Elaborated help is most frequently offered in mixed gender groups.
Finally, the relation between group size and student involvement and interactions is presented in Table 7.

Table 7 Involvement and interactions in groups of different sizes (% of peer work group time)

	involvement	interactions between students				
	on-task	coop.	help+	help-	off-task	total
- 2 students	81	21,4	3,6	1,0	5,3	36,7
- 3 students	64	1,4	5,2	0,3	4,6	15,4
- 4 students	67	6,1	5,4	0,3	5,7	21,3
- 5 students	68	2,7	5,8	0,8	3,6	16,7
- 6 students	68	0,1	4,1	0,4	5,0	16,5

Groups with only two students are more involved; these students also show more cooperative interactions than students in larger groups (the time spent on interactions is computed per student).

Teacher behavior and student involvement and interactions
The first step in the multilevel analyses is to model the organizational factors. The non-significant variables are omitted one by one from the model. In the next step, the teacher variables (mean teacher scores and deviant scores) are modelled one by one. The program estimates the regression coefficient and standard error of each variable, taking the effects of the other modeled variables into account. Thus, regression coefficients represent the individual contribution of each variable to the explanation of differences between lessons/teachers in student involvement and interactions.

Table 8 shows regression coefficients of significant (α=.05) organizational factors. All variables are standardized and modeled as categorical (dummy) variables.

Table 8 Regression coefficients and standard errors of the significant organizational factors

	involvement	interactions between students			
	on-task	coop.	help+	help-	off-task
type of peer work groups					
- individual seatwork			-.5 (.3)		
helping groups					
- students are allowed to ask each other for help					
- students ask firstly another student for help before they go to the teacher					
cooperation groups					
- students are allowed to cooperate		.6 (.2)			
- students should cooperate, but make a product (solution or paper) separately		2.3 (.2)	-.8 (.3)		
- students should cooperate and make together one (group) product		1.2 (.3)	-.8 (.4)		
subject					
- mathematics					
- language					
- sciences			1.0 (.3)		
- students may choose between math, language (and sciences)	-.4 (.2)		.5 (.2)		
- project	-1.3 (.3)				1.7 (.3)
group composition - grades					
- grade 6, 7 and 8 combined					
- grade 6 and 7/grade 7 and 8			-.7 (.2)		
- grade 6/grade 7/grade 8					
group composition - gender					
- only boys					
- mixed	-.5 (.3)				
- only girls				1.1 (.3)	

The results of the multilevel analyses concerning the organizational factors correspond with the figures in Table 3 to 7. With respect to on-task behavior, only subject and gender of the students in the observed group have (still) a significant effect. As was expected, the type of interaction (cooperation/giving elaborated help) is strongly related to the type of peer work group. Low-level help especially occurs in girls-groups.

Table 9 shows the regression coefficients of the teacher variables, taking into account the effects of the organizational variables.

Table 9 Regression coefficients and standard errors of the significant teacher variables, taking into account the organizational factors

	involvement	interactions between students			
	on-task	coop.	help+	help-	off-task
% time teacher sits at his desk					
- deviation from mean teacher score				.19 (.08)	
- mean teacher score					
% time teacher controls students					
- deviation from mean teacher score		.14 (.06)			
- mean teacher score					
% time teacher observes class					
- deviation from mean teacher score	.21 (.07)			-.15 (.08)	-.16 (.07)
- mean teacher score					
% time teacher is off-task					
- deviation from mean teacher score					
- mean teacher score		-.11 (.06)		.17 (.08)	
number of times that teacher visits a group					
- deviation from mean teacher score	.27 (.07)	.26 (.07)			-.15 (.07)
- mean teacher score					
duration of contacts teacher with students					
- deviation from mean teacher score			-.27 (.08)		
- mean teacher score					
% time teacher is visiting the observed group					
- deviation from mean teacher score			-.19 (.07)		
- mean teacher score			.27 (.09)		
% time that teacher interacts with (member of) observed group					
- deviation from mean teacher score	-.20 (.07)				
- mean teacher score					

The most significant variables are the percentage of time the teacher observes the classroom, and the number of groups visited by the teacher. Observing the class has a positive effect on involvement and a negative effect on low-level help and off-task interactions. A lot of short visits to all groups has a positive effect on involvement of students and on cooperative interactions, and a negative effect on off-task

interactions.

Teachers can achieve a high involvement of students, if he does not visit the observed group for a long time, although he has to observe the class and visit groups frequently.

Teachers positively affect the percentage of cooperative interactions, by controlling activities and understanding of students, by active involvement in the current lesson, and by often visiting the groups of students. Elaborated help can be promoted by teachers by interacting with the observed group, but contacts with the students should be short. The negative effect of the deviation score of 'interacting with observed group' is possibly caused by the effect that when teachers interact too much with students, there is no time left for student help. Thus, in general, interacting with students will promote giving elaborated help to other students, except when the teacher exceeds a certain level.

Teachers may prohibit low-level help by walking through the classroom and visiting groups instead of sitting at their desks, by observing the class, and by active involvement in the current lesson. Off-task interactions may be repelled by the teacher by observing the class and often visiting groups of students.

Although most of the variables yield small effects in just one or two analyses, all effects point in the same direction: to promote desired student behavior (involvement in the task, cooperation, and giving elaborated help) and to avoid undesirable student behavior, teachers should monitor the classroom, observe the students and have many short contacts with all the students.

Most of the effects concern deviation scores. This means that differences between the lessons mainly cause the variance in the dependent variables. This is also shown by the variance components (Table 10).

Most of the variance in student involvement and interactions are due to differences between lessons. For involvement, cooperative interactions and low-level help only 2% to 4% of the variance is due to differences between classrooms/teachers. For cooperation and elaborated help, a major proportion of variance is explained by the organizational and the teacher variables (respectively 60% and 43% of the total variance). Of the variance in low-level help, only 15% is explained. This low percentage is probably related to the fact that low-level help hardly occurs. 25% of the variance in off-task interactions is explained. The motivation of the students in the particular lessons may also play an important role. The same may hold for the involvement of the students (31% of the variance is explained). The organizational variables explained the largest part of the variance.

Table 10 Variance components of the dependent variables before and after the independent variables are modelled

	involvement	interactions between students			
	on-task	coop.	help+	help-	off-task
before independent variables are modelled					
lesson variance	96%	96%	76%	98%	85%
teacher variance	4%	4%	24%	2%	14%
total	100%	100%	100%	100%	99%
with independent variables modelled					
lesson variance	65%	40%	55%	85%	64%
teacher variance	4%	0%	2%	0%	11%
variance explained	31%	60%	43%	15%	25%

CONCLUSIONS

Helping groups are the most frequently used type of peer work groups. Cooperative groups are used only 20% of the total (peer work group) time, even by teachers, who state that they use cooperative learning frequently. Peer work groups with competitive reward structures were not found at all. Teachers mostly use individualistic reward structures. In this study, the degree to which students are involved in their tasks and the degree to which students show desirable and undesirable interactions during peer work groups is related to organizational factors and the teacher behavior.

The extent of different types of interactions between students is, as expected, strongly related to the type of peer work group: in helping groups, students tend to give/receive more (elaborated) help, and in cooperation groups more cooperative interactions are found. Student involvement is highest in peer work groups in which students should cooperate and produce one solution or paper together. This result indicates that in groups with cooperative reward structures students may stimulate each other to work hard (Slavin, 1987).

With respect to subjects, in science lessons not only more cooperation, but also more helping occurred. During project activities (students choose a topic, search for information, write and present a paper), the involvement of students is low, and the

percentage of off-task interactions high. Students often walk around to search for information and probably they can not resist the temptation to chat with other students. The tasks that students should perform were mostly tasks that focus on application (89%). This is remarkable, because cooperation is considered especially appropriate for acquisition of knowledge (Cohen, 1992). An explanation for this result may be that at least for mathematics the assignments in the present textbooks and other materials in the Netherlands only focus on applications and are often not appropriate for cooperation (Munnik, 1992).

Another important organizational factor is the group composition. In line with the results found by Swing and Peterson (1982) and by Bennett and Cas (1988) in groups consisting of students of three different grades the students of the highest and lowest grade had a tutor-tutee relation (the first one helped the other), while in single grade groups students showed more cooperation. In groups consisting of students of two grades, however, a high level of off-task interactions was found. As Morine and Dershimer (1985) found, girls interact more with each other. However, they also give more low-level help to each other. With respect to group size, students seem to interact mostly just with one other student at the same time. In groups larger than two students, involvement was far lower. Students are probably distracted from their work when other students in their group interact.

The effects of teacher behavior during peer work groups was analyzed by means of multilevel analyses. The results showed that monitoring is not only promoting for student involvement in their tasks (as was expected), but also for the interactions that were considered as favorable. A possible cause is that predominantly **application** tasks were performed. Monitoring behavior of teacher might obstruct the interactions of students who perform a task that focuses on the **acquisition** of knowledge (Cohen, 1992). For application tasks, this study indicates that teachers promote involvement and cooperative interactions and (elaborated) helping behavior of students, and prohibit low-level help, and off-task interactions by observing and controlling the students and frequent short contacts with all (groups of) students.

Unfortunately, it was not possible to investigate the relation with student achievement in this study. Further research will show whether the interactions that are considered favorable to achievement really do affect achievement. The intermediating role of student involvement and interactions between teacher behavior and organizational factors and student achievement will be an interesting topic for future research.

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